Influencing Automatic Behaviours to Reduce Waste at Facility Operations

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Citation:
Kuijlenburg, R., Poldner, K.A., and Mobach, M.P. (2020) Influencing automatic behaviours to reduce waste at facility operations, In the Companion proceedings of the European Facility Management International Conference 2020, EFMIC 2020, 1 October 2020, online conference.

ABSTRACT

Background and aim – Many countries signed the Paris Agreement in order to mitigate global average temperature rise. In this context, Dutch authorities also decided to realize a maximum of 35% residual waste by 2020 for its own operations. So, 65% of the total waste should be recyclable or re-usable and only a maximum of 35% should be not. This current paper explores how changes in automatic behaviours, facility operations and related practice-oriented research can contribute to this aim of the authorities.

Methods – Desk research.

Results – Three different focal points can potentially contribute to achieving a maximum of 35% residual waste at facility operations. These are interventions at automatic user behaviours, spatial transformations to support more favourable sustainable automatic behaviours, and the design of relevant management systems for facility professionals.

Originality – Waste is only an end station of an entire supply chain. Meaningful interventions at different stages can improve the sustainability of facility operations, i.e. at the behaviour and spaces of users and at management systems of professionals. Students in facility management will be involved in all stages.

Practical or social implications – The facility management profession has an important role to play in the mitigation of global average temperature rise. However, facility professionals struggle to find efficacious sustainable solutions. Professionals are supported with interventions that have proven effectiveness on reduction of residual waste. These developments result in restraint behaviour and a certain shyness for action. That is why too often sustainability policies are linked to waste separation with the idea that it is tangible and easy to implement. However, this is an oversimplification of reality.

Type of paper – Position paper.

KEYWORDS

Circularity, facility management, operations, procurement, space, sustainability, waste reduction.

INTRODUCTION

Similar to other countries in the world, The Netherlands pursues the objectives of the Paris Agreement 2016 in order to mitigate global average temperature rise. In 2019, Dutch authorities, business, and not-for-profit organizations agreed to contribute to Paris with energy transition (100% renewable), climate transition (95% CO_2 reduction), and circularity (100% reuse of raw materials in 2050). This means that the landfill / incineration of Dutch waste must be halved from 10 Mton in 2012 to 5 Mton in 2022. In her role model, Dutch central authorities decided to set higher standards and to reduce even more waste. A total of 65% of the waste should be recyclable or re-usable and an absolute maximum of 35% should be not (in 2018 this latter percentage was 62%) (Ministerie van Economische Zaken en Klimaat, 2019). This aim of the authorities and its relation with facility management (FM) is the focus of our current study. How to reduce waste with changes in automatic behaviours and facility operations?

In this context, a Dutch consortium was set up in order to reduce waste, to a maximum of 35% residual waste by 2020. Facility providers of the Custodial Institutions Agency (DJI), Ministry of Security and Justice, FM Haaglanden (FMH), The Ministry of the Interior and Kingdom Relations (BZK), The Hague

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University of Applied Sciences (THUAS), and Hanze University of Applied Sciences Groningen decided to work together on this topic. Starting point was the challenge to embed the sustainability objective in the day-to-day facility operations. Moreover, a challenge to encourage sustainable behaviour of building's occupants was added. After all, research shows that behavioural change is a complex and demanding managerial task (Broeders, Midden, & Ham, 2010). Ingrained patterns and automatic behaviour of people are the weak links for sustainable awareness and an important cause for non-sustainable behaviours.

In this context, the current paper explores how FM and its daily operations can achieve the 35% residual waste standard compared to 2012. The consortium provides us with wonderful opportunities, such as studies in penitentiaries, offices of national authorities, and a university. Field experiments will be conducted, most of them with students. This current paper aims to share the design of one of these studies: tracking waste in penitentiaries, office buildings, and a university.

RESEARCH QUESTIONS

The general aim of this research is how to enable the reduction of PMC waste (low-density polyethylene plastic, metal, and cartons), getting grip on logistics of waste flows, and to promote more sustainable behaviour. The latter with a focus on buildings occupants such as detainees, civil servants, prison guards, students, and facility employees. The objective is to develop a best practice: prevention of waste rather than 'recycling', 'down cycling', and 'up cycling'. We organized the preparation of our studies around the following questions:

- Can interventions in automatic behaviours contribute to sustainability?
- Can the sustainability of automatic behaviours become more favourable by spatial transformations?
- What systems can support facility professionals in achieving a maximum of 35% residual waste at facility operations?

RESEARCH DESIGN

This research project is based on the cycle for practice-oriented research and innovation by Van der Donk & Van Lanen (2016). Practice-oriented research is research that is being conducted by professionals from the specific field, by which, on a systematic basic, answers are deducted from the direct surroundings. This approach is aimed at creating better solutions for problems present in day-to-day encounters (Van der Donk & Van Lanen, 2016). The choice for this research methodology is the societal problem of waste in relation to the day-to-day encounter of the facility professional with waste management. Moreover, combine this with desk research, inductive reasoning, and participatory action research with our consortium partners; trying to find solutions that work. A key characteristic of these approaches is that it focuses on finding solutions to problems encountered by professionals in actual practice. Through active collaboration between professionals in the public sector and higher education, the acquired knowledge and research findings end up directly in professional practice. Moreover, it will be applied in the curriculum of universities, for instance, via research groups, lecturers, and instructors.

Within this scope, theoretical and empirical research will be conducted using both quantitative and qualitative methods. We will employ a combination of, for instance, interviews, document analysis, process analysis, spend analysis, shadowing, focus groups. Important focal point are the behaviours of facility professionals and buildings occupants, presuming that appropriate spatial and organizational interventions at these stakeholders can potentially stimulate waste reduction.

THEORY

In 2020 most Dutch building owners and related facility management professionals have taken steps for waste separation (Ministerie van Infrastructuur en Rijkswaterstaat, 2020). Despite waste management policies and the introduction of waste separation systems, it appears to be very difficult to separate waste correctly. Based on recent sampling and monitoring only 25% of the mono-flow waste output is clean and 75% is contaminated by other flows. Practitioners argue that the 35% residual waste is very difficult to achieve (DJI, 2019). As a result, most targets are currently not met. End users play a crucial role in sorting waste. But how to stimulate building occupants to start separating waste correctly?

Automatic behaviour

A big trap in 'sustainable thinking and sustainable acting' is the so-called 'cognitive ease' (Broeders, Midden, & Ham, 2010). This means that in general people prefer to respond in such way that requires little cognitive effort and will behave in the easiest way. A deliberate and reasoned processing of information and decision-making is only used if this really cannot be otherwise (Broeders, Midden & Ham, 2010). This is caused by the facts that the human brain, as a result of its evolution, is primarily designed for fully automatic repetition of habitual behaviour. The human brain wants to 'accomplish as much as possible by as little effort as possible'. In addition, it is designed to avoid pain, discomfort, and loss. In many cases, this hinders the motivation to adopt new habits (Woolley & Fishbein, 2017). After all, the chance of failure, and therefore pain, discomfort, and loss are far greater during transformation processes and experimenting with new habits in contrast to automatic behaviour where the outcome is predictable and less risky. These principles were discovered by Daniel Kahneman (1974) based on ground-breaking scientific research of the brain's chemistry where two systems were distinguished that steer our actions. System 1 is fast, intuitive, emotional, and dominant whereby conclusions are drawn (too) quickly without rational considerations; System 2 is slower, deliberative, and more logical. Kahneman's research shows that the majority of our daily behaviour is full of automatisms driven by System 1. Therefore, it is necessary to intervene in these 'automatic mental processes' to achieve successfully sustainable behavioural changes (Broeders, Midden, & Ham, 2010).

Space and behaviour

Apart from internal physiological dynamics, the human brain is also influenced by external factors, such as the physical and social environment that continuously is driving our behaviours and actions (Gibson, 1966; Ulrich, 1991; Mobach 2009). In the 1960s, Gibson formulated the 'affordance theory' demonstrating that a multidisciplinary and integral approach is needed for a successful change of systematic sustainable behaviour. In short, Gibson defines 'affordance'- i.e., an opportunity for action- of the environment as the interaction between space and people. Both are complementary and influence each other. Not only Gibson's 'affordance theory' underscores the importance of an integrally approach of promoting sustainable behaviour as a relationship between people and space, also the anthropology, psychology, sociology, behavioural economics, environmental psychology, philosophy and planning underline this interaction between people and space (Downs & Stea, 1973, 1977; Ittelson, 1973; Moore, 1976; Lefebvre, 1991; Shefrin, 2002; Steg & Buijs, 2004; Van Andel & Hamel, 1981; Bouma et al., 2018). Hence, promoting sustainable behaviours requires research into both the conscious and unconscious actions and the spatial environment in which people are residing.

Individual preferences and behaviours are intertwined with physical spaces. This perspective provides a framework for understanding the relationships between the way people organize themselves and the relationship they have with the spaces around them. Space as a social construction. In this context, Lefebvre (1991) defines space as both physical space and the way in which space is conceived. He argues that space is under constant social construction; therefore, he uses the term 'social space' (Lengkeek, 2002).

In this perspective, people 'produce' space by giving it meaning. This approach also provides insight into the way in which space can be created as a meaningful place so that desired sustainable behaviour can be achieved. The question here is how habitual behaviours, often driven by impulsive behaviour and cognitive ease, can be changed by transformations in the physical and social space. The focus on automatic processes is a useful approach to get a grip on automatisms of sustainable behaviours (Gregory & Di Leo, 2003).

Facility operations

Although the design of the space is mostly initiated by other disciplines (architecture, real estate, interior designers, technical installers, planners, investors, etc.), the facility professional is responsible for maintenance and the operation of the facility service, based on a multidisciplinary approach whereby the integration of 'people', 'place', 'process', and 'technology' should lead to well-being ('prosperity') for building occupants (ISO, 2018). An example is the use of innovative technology for energy saving (sensors that support user behaviour to save energy and water), the 'upcycling' of waste into new

products, and inclusiveness (including workers with disabilities). Therefore, FM has the potential to improve sustainability, sustainable behaviours, and inclusiveness. This means that FM must develop and apply a successful sustainable strategy for its operations.

In 2014, AAFM reported that 21% of the total energy consumption in the Netherlands is credited to the commercial real estate and the 7% of the total CO_2 emissions are caused by the heating and cooling of commercial real estate, with peaks during hot summer days. In these settings, approximately 30% of the water use is for the greenery around the building. Logistics and waste management also provide facility managers with ample opportunities for sustainable improvement of the supply chain.

There are good examples of successful sustainable interventions, such as water saving faucets, light sensors, and smart indoor climate systems. Moreover, socially responsible procurement is also taken very seriously within the Dutch central government. Yet there is still a world to be won. Moreover, a better integration of services and spaces can ensure positive changes in sustainable behaviour of buildings occupants (FMN/Twijnstra Gudde, 2019).

Our expectation is in line with these observations. Substantial steps can still be taken within waste management. For this reason, it is important that research is conducted on the operational phase of a building with associated needs of services in order to retrieve knowledge about daily behavioural patterns of buildings occupants and their footprint. Research will enable facility professionals to improve their protocols, both for facility operations and buildings users, all aiming to promote more sustainable behaviours. For instance, data of spend analyses and of experiences of cleaning services and waste management are generating valuable insights on behaviour of professionals and users. Data on energy and water consumption, but also the procurement of mobile phones, vehicles, catering (with or without disposables), plastics, and waste processing are important topics for our research.

THREE DIFFERENT STAGES

The entire research project consists of three stages in which students will conduct research within the built and organizational environment with consortium partners. These consists of focal point at automatic behaviour, space and behaviour, and facility operations. Firstly, for the analyses of automatic behaviours, students will investigate building occupants by shadowing. Students will observe the waste behaviour of buildings occupants in their natural environment. This should lead to a clarification of methods of waste separation and identifying bottlenecks within the building. Secondly, in order to better align spaces and behaviour data will be collected with direct observations in buildings, interviews with buildings occupants, and waste counting and weighing by students. For a predetermined period, students will collect waste and measure the various waste streams in two prisons, an office building, and at the university campus. This allows us to improve our understanding of how spaces- physical and social - are interrelated with unfavorable behaviours. Moreover, students will be involved to develop new waste bins and better spatial positioning and orientation of bins. For instance, in line with the automatic behaviours determined in the previous stage. Thirdly, with respect to the facility operations students will conduct spend analysis of the purchases of prisons and the university. Moreover, new protocols will be established to better understand waste flows and waste reduction. This should help facility professionals with waste reduction. These outcomes will also be useful as starting point for a debate among purchasing and procurement officers. After all, the purchasing department is often a starting point for raw materials that will end as waste.

We also carefully select the data from the above stages as an input for better facility management. For instance, data to create a dash board to improve sustainable facility operations and contract management. All these measures have a clear focus on supporting the FM professional to achieve a maximum of 35% of residual waste.

CONCLUSION

Sustainability is a trend and a 'buzz' word (FMN/Twynstra Gudde, 2019). However, exploratory research also shows that yet little is known about critical success factors with which facility professionals can stimulate sustainable behaviours and processes. The focus is often on a small number of aspects and

lacks integrated solutions (Twynstra Gudde/FMN, 2019; Gluch & Svensson, 2017; Lohman Rasmussen, Jensen, & Balslev Nielsen 2017).

The facility management profession has an important role to play in the mitigation of global average temperature rise. However, facility professionals struggle to find efficacious sustainable solutions. The enormously broad concept of sustainability does not help to focus operations. Moreover, there is a lack of efficacious protocols and procedures. Also, professionals lack interventions with proven effectiveness on reduction of residual waste. These developments result in restraint behaviour and a certain shyness for action. That is why too often sustainability policies are linked to waste separation with the idea that it is tangible and easy to implement. However, this is an oversimplification of reality. Waste is the end station of an entire supply chain. For this reason this research project will focus on meaningful interventions at both the start and the end of the supply chain: purchase management, waste management, and everything in between that is necessary to improve the sustainability of facility operations.

We can only do so, with better- much more integrated- research, practice, and education. Our future is in the hands of the next generation, our students as a new generation of FM professionals. In line with Greta Thunberg: "We can't save the world by playing the rules, because the rules have to change! Everything needs to change- and it has to start today" (Corbett, 2018). So, let's change!

ACKNOWLEDGEMENTS

We are grateful for the support of the Ministry of Security and Justice and the Ministry of the Interior and Kingdom Relations.

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ACKNOWLEDGEMENTS

Prof. Mark Mobach and his research team would like to gratefully acknowledge the honour of receiving Delta Prize (in Dutch 'Deltapremie') handed by Ingrid van Engelshoven, Minister of Education, Culture and Science, in The Netherlands in November 2019. The authors of the papers in companion proceedings of the European Facility Management International Conference 2020 are grateful to acknowledge the support of the Netherlands Association of Universities of Applied Sciences and the Dutch Taskforce for Applied Research. They also thank EuroFM for the collaboration and the possibilities for sharing their results and ideas with the EuroFM community.

Deltapremie

The 'Deltapremie' or Delta Prize is a new leading research prize in the Netherlands focusing on practice-oriented research by professors. The prize is developed for professors who have managed to repeatedly make a special difference with the social impact of their research over the years. It shows where practice and research can come together in an innovative way. Practice-oriented research has acquired a solid place in Dutch society. Almost 700 professors and more than 3,000 teacher-researchers are currently involved. The starting point of the research is always to find solutions for practice-based problems, also by partnering with practice. In this way, practice-oriented research provides applicable solutions to societal challenges.

An independent selection committee selected the winners. The committee consisted of six experts from Erasmus University Rotterdam, Innofest, Delft University of Technology, Netherlands Study Centre for Technology Trends, and the Association of Netherlands Municipalities. In the report the selection committee tributes Mark Mobach and his research group for the impact that they have on the crossroads of various domains from public transport to mental health. Mobach: "We see the prize as enormous encouragement to continue our research into space and organisation in healthcare, education, offices, and cities together with our partners. We extend our research to areas where there are perhaps fewer financial possibilities, such as research with the arts and frailty."

Research focus area

With his research group, Prof. Mobach wants to contribute to the best buildings for people and organisations. He does so by devising better space and services in a multidisciplinary setting together with students, lecturer-researchers, Ph.D.-students, and postdocs. Better spaces and services for education, offices, and even cities that stimulate healthy behaviour, better healthcare buildings that reduce stress, but also prisons and stations that better meet the needs of society.